

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A speech decoding device which decodes speech signals by using received feature parameters for a gain and for spectral envelope characteristics, said speech signals being classified as a voice period or a voice-less period, the device comprising:

a voice-less decoding circuit for decoding the speech signals in said voice-less period by smoothing ~~at least one said~~ feature parameter ~~representing~~ for spectral envelope characteristics, ~~said feature parameter being from the feature parameters received in said voice-less period , and~~ synthesizing said speech signals based on said smoothed feature parameter for spectral envelope characteristics and said feature parameter for a gain.

2. (Original) A speech decoding device which decodes a speech signal by using received feature parameters according to whether the speech signal to be decoded is in a voice period or in a voice-less period, the device comprising:

a voice-less part decoding unit which changes, according to an elapsed time from a time point when a transition occurs from the voice period to the voice-less period, a coefficient used to smooth at least one of the feature parameters, and decodes the speech signal in the voice-less period by smoothing at least one of the feature parameters with the changed coefficient.

3. (Original) The speech decoding device of claim 2, wherein the voice-less part decoding unit decodes the speech signal by using at least one of the received feature parameters as it is in a time period immediately after changing from the voice period to the voice-less period, and decodes the speech signal by using at least one smoothed feature parameter selected from the feature parameters after the time period.

4. (Original) A speech decoding device which decodes speech signal by using received feature parameters according to whether the speech signal to be decoded is in a voice period or in a voice-less period, the device comprising:

a voice-less part decoding unit which changes a value of a coefficient used to smooth at least one of the feature parameters according to the feature parameters, and decodes the speech signal in the voice-less period by smoothing at least one of the feature parameters with the changed value of the coefficient.

5. (Original) The speech decoding device of claim 4, wherein the voice-less part decoding unit decodes the speech signal by using at least one of the received feature parameters as it is while a feature parameter satisfies a predetermined condition, and decodes the speech signal by using at least one smoothed feature parameter selected from the feature parameters after the condition is not satisfied.

6. (Previously Presented) A speech decoding device which decodes speech signal by using received feature parameters according to whether the speech signal to be decoded is in a voice period or in a voice-less period, the device comprising:

a voice-less part decoding unit which changes a value of a coefficient used to smooth at least one of the feature parameters according to information representing whether a new feature parameter is transmitted or not, and decodes the speech signal in the voice-less period by smoothing at least one of the feature parameters with the changed value of the coefficient.

7. (Original) The speech decoding device of claim 2, wherein the voice-less part decoding unit changes, according to an elapsed time from a time point when a transition occurs from the voice period to the voice-less period and to the feature parameters, a value of a coefficient used to smooth at least one of the feature parameters, and decodes the speech signal in the voice-less period by smoothing at least one of the feature parameters with the changed value of the coefficient.

8. (Original) The speech decoding device of claim 3, wherein when the decoding process of the speech signal in the voice-less period is performed after the time period, the decoding process is performed by using at least one smoothed feature parameter selected from the feature

parameters, according to an elapsed time from a time point when a transition occurs from the voice period to the voice-less period and to at least one of the feature parameters.

9. (Original) The speech decoding device of claim 5, wherein when the decoding process of the speech signal in the voice-less period is performed after the time period, the decoding process is performed by using at least one smoothed feature parameter selected from the feature parameters, according to an elapsed time from a time point when a transition occurs from the voice period to the voice-less period and to at least one of the feature parameters.

10. (Original) The speech decoding device of claim 2, wherein the voice-less part decoding unit decodes the speech signal by using at least one of the received feature parameters as it is, in a first time period immediately after changing from the voice period to the voice-less period and in a second time period while the feature parameter satisfies a predetermined condition, and decodes the speech signal by using at least one smoothed feature parameter selected from the feature parameters after the first time period or the second time period is past.

11. (Previously Presented) The speech decoding device of claim 2, wherein the voice-less part decoding unit changes a value of a coefficient used to smooth at least one of the feature parameters according to information representing whether a new feature parameter is transmitted or not, and decodes the speech signal in the voice-less period by smoothing at least one of the feature parameters with the changed value of the coefficient.

12. (Previously Presented) The speech decoding device of claim 4, wherein the voice-less part decoding unit changes a value of a coefficient used to smooth at least one of the feature parameters according to information representing whether a new feature parameter is transmitted or not, and decodes the speech signal in the voice-less period by smoothing at least one of the feature parameters with the changed value of the coefficient.

13. (Original) The speech decoding device of claim 6, wherein the voice-less part decoding unit receives information representing whether the feature parameters are sent at a sending location.

14. (Original) The speech decoding device of claim 11, wherein the voice-less part decoding unit receives information representing whether the feature parameters are sent at a sending location.

15. (Original) The speech decoding device of claim 12, wherein the voice-less part decoding unit receives information representing whether the feature parameters are sent at a sending location.

16. (Original) The speech decoding device of claim 1, wherein when a length of a voice period immediately before a first voice-less period is shorter than a predetermined length, a value of a feature parameter which is finally transmitted in a second voice-less period immediately before the voice period is used as an initial value of smoothing.

17. (Original) The speech decoding device of claim 2, wherein when a length of a voice period immediately before a first voice-less period is shorter than a predetermined length, a value of a feature parameter which is finally transmitted in a second voice-less period immediately before the voice period is used as an initial value of smoothing.

18. (Original) The speech decoding device of claim 4, wherein when a length of a voice period immediately before a first voice-less period is shorter than a predetermined length, a value of a feature parameter which is finally transmitted in a second voice-less period immediately before the voice period is used as an initial value of smoothing.

19. (Original) The speech decoding device of claim 6, wherein when a length of a voice period immediately before a first voice-less period is shorter than a predetermined length, a value of a feature parameter which is finally transmitted in a second voice-less period immediately before the voice period is used as an initial value of smoothing.

20. (Original) A speech decoding device which decodes speech signal by using received feature parameters according to whether the speech signal is in a voice period or in a voice-less period, the device comprising:

a voice-less part decoding unit which generates signals in the voice-less period by feeding an excitation signal composed of plural types of signals to a synthesis filter in the voice-less period, wherein the voice-less part decoding unit comprises a weighting coefficient determining unit which determines a weighting coefficient used in a weighted sum operation of the plurality of types of signals in the voice-less period according to at least one feature parameter, and the excitation signal generated by using the weighting coefficient is fed to the synthesis filter.

21. (Original) A speech decoding device which decodes speech signal by using received feature parameters according to whether the speech signal is in a voice period or in a voice-less period, the device comprising:

a voice-less part decoding unit which generates signals in the voice-less period by feeding an excitation signal composed of plural types of signals to a synthesis filter in the voice-less period, wherein the voice-less part decoding unit comprises a weighting coefficient determining unit which determines a weighting coefficient used in a weighted sum operation of the plurality of types of signals in the voice-less period according to at least one smoothed feature parameter obtained by smoothing a feature parameter selected from the received feature parameters in a time direction, and the excitation signal generated by using the weighting coefficient is fed to the synthesis filter.

22. (Original) The speech decoding device of claim 1, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

23. (Original) The speech decoding device of claim 2, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

24. (Original) The speech decoding device of claim 4, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

25. (Original) The speech decoding device of claim 6, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

26. (Original) The speech decoding device of claim 20, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

27. (Original) The speech decoding device of claim 21, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

28. (Original) The speech decoding device of claim 1 being included in a speech coding/decoding device with a coding device which determines whether the input signal is in a voice period or in a voice-less period for each frame and encodes the feature parameters of the input signals to output.

29. (Original) The speech decoding device of claim 2 being included in a speech coding/decoding device with a coding device which determines whether the input signal is in a voice period or in a voice-less period for each frame and encodes the feature parameters of the input signals to output.

30. (Original) The speech decoding device of claim 4 being included in a speech coding/decoding device with a coding device which determines whether the input signal is in a voice period or in a voice-less period for each frame and encodes the feature parameters of the input signals to output.

31. (Original) The speech decoding device of claim 6 being included in a speech coding/decoding device with a coding device which determines whether the input signal is in a voice period or in a voice-less period for each frame and encodes the feature parameters of the input signals to output.

32. (Original) The speech decoding device of claim 20 being included in a speech encoding/decoding device with a coding device which determines whether the input signal is in a voice period or in a voice-less period for each frame and encodes the feature parameters of the input signals to output.

33. (Original) The speech decoding device of claim 21 being included in a speech coding/decoding device with a coding device which determines whether the input signal is in a voice period or in a voice-less period for each frame and encodes the feature parameters of the input signals to output.

34. (Currently Amended) A method of decoding speech signals by changing a decoding operation corresponding to received feature parameters for a gain and for spectral envelope characteristics according to whether the speech signals are classified as a voice period or a voice-less period, the method comprising the steps of:

smoothing at least one said feature parameter ~~representing~~ for spectral envelope characteristics of the speech signals to be decoded in said the voice-less period, ~~said feature parameter being from the feature parameters received in said voice-less period~~; and

decoding the speech signal ~~in the voice-less period by using the smoothed feature parameter~~ for spectral envelope characteristics and said feature parameter for a gain.

35. (Previously Presented) A method of decoding speech signals by changing a decoding operation corresponding to received feature parameters according to whether the speech signals are classified as a voice period or a voice-less period, the method comprising the steps of:

smoothing at least one of the feature parameters according to an elapsed time from a time point when a transition occurs from the voice period to the voice-less period; and

decoding the speech signal in the voice-less period by using the smoothed feature parameter.

36. (Original) The method of claim 35, wherein the smoothing step further comprises the steps of:

(a) providing at least one of the received feature parameters as it is as the smoothed feature parameter in a certain time period immediately after changing from the voice period to the voice-less period; and

(b) smoothing at least one of the received feature parameters in a time period other than the certain time period.

37. (Currently Amended) A method of decoding speech signals by changing a decoding operation corresponding to received feature parameters according to whether the speech signals are classified as a voice period or a voice-less period, the method comprising the steps of:

smoothing at least one of the feature parameters according to the received feature parameters, wherein the smoothing changes a coefficient used to smooth at least one of the received feature parameters according to information representing whether a new feature is transmitted or not; and

decoding the speech signal in the voice-less period by using the smoothed feature parameter.

38. (Original) The method of claim 37, wherein the smoothing step further comprises the steps of:

(a) providing at least one of the received feature parameters as it is as the smoothed feature parameter when a feature parameter satisfies a predetermined condition; and

(b) smoothing at least one of the received feature parameters after the condition is not satisfied.

39. (Previously Presented) A method of decoding speech signals by changing a decoding operation corresponding to received feature parameters according to whether the speech signals are classified as a voice period or a voice-less period, the method comprising the steps of:

smoothing at least one of the feature parameters according to information representing whether the feature parameters are transmitted or not; and

decoding the speech signal in the voice-less period by using the smoothed feature parameter.

40. (Original) The method of claim 35, wherein the smoothing step smoothes at least one of the received feature parameters according to an elapsed time from when a transition occurs from the voice period to the voice-less period, and the feature parameters.

41. (Original) The method of claim 35, wherein the smoothing step smoothes at least one of the received feature parameters according to an elapsed time from when a transition occurs from the voice period to the voice-less period, and at least one of the feature parameters, after at least one of the feature parameters is used as it is.

42. (Original) The method of claim 37, wherein the smoothing step smoothes at least one of the received feature parameters according to an elapsed time from when a transition occurs from the voice period to the voice-less period, and at least one of the feature parameters, after at least one of the feature parameters is used as it is.

43. (Original) The method of claim 35, wherein the smoothing step further comprises the steps of:

(a) providing at least one of the received feature parameters as it is, in a first time period immediately after changing from the voice period to the voice-less period and in a second time period while the feature parameter satisfies a predetermined condition; and

(b) smoothing at least one of the received feature parameters in a time direction after the first time period or the second time period is past.

44. (Previously Presented) The method of claim 35, wherein the smoothing step changes a coefficient used to smooth at least one of the received feature parameters according to information representing whether a new feature is transmitted or not.

45. (Cancelled).

46. (Previously Presented) The method of claim 39 further comprising the step of receiving the information representing whether a new feature is transmitted or not.

47. (Previously Presented) The method of claim 44 further comprising the step of receiving the information representing whether a new feature is transmitted or not.

48. (Previously Presented) The method of claim 45 further comprising the step of receiving the information representing whether a new feature is transmitted or not.

49. (Previously Presented) A method of decoding speech signals based on received feature parameters by changing a decoding operation according to whether the speech signals are classified as being a voice period or in voice-less period, at least a part of decoding process in the method in the voice-less period comprising the steps of:

determining a weighting coefficient used to generate an excitation signal of the voice-less period by performing a weighted sum operation of plural types of signals based on at least one of the received feature parameters; and

generating the excitation signal based on the weighting coefficient, and generating speech signal in the voice-less period by feeding the excitation signal to a synthesis filter.

50. (Previously Presented) A method of decoding speech signals based on received feature parameters by changing a decoding operation according to whether the speech signals are classified as being a voice period or a voice-less period, at least a part of decoding process in the method in the voice-less period comprising the steps of:

smoothing the received feature parameters and calculating smoothed parameters;

determining a weighting coefficient used to generate an excitation signal of the voice-less period by performing a weighted sum operation of plural types of signals based on at least one of the smoothed parameters; and

generating the excitation signal based on the weighting coefficient, and generating speech signal in the voice-less period by feeding the excitation signal to a synthesis filter.

51. (Previously Presented) The method of claim 34, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

52. (Previously Presented) The method of claim 35, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

53. (Previously Presented) The method of claim 37, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

54. (Previously Presented) The method of claim 39, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

55. (Previously Presented) The method of claim 49, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

56. (Previously Presented) The method of claim 50, wherein the feature parameters includes at least one of a quantity representing spectral envelope of the signals to be decoded and a quantity representing power of the signals to be decoded.

57. (Currently Amended) A ~~recording~~ computer readable storage medium which ~~records~~ stores a computer executable program performing a method of decoding speech signals by changing a decoding operation corresponding to received feature parameters for a gain and for spectral envelope characteristics according to whether the speech signals are classified as a voice period or a voice-less period, the computer executable program operable to, when executed by a processor, ~~cause a device to perform the acts of:~~

smoothing ~~at least one~~ said feature parameter ~~representing for~~ for spectral envelope characteristics of the speech signals to be decoded in said the voice-less period, ~~said feature parameter being from the feature parameters received in said voice-less period;~~ and

decoding the speech signal ~~in the voice-less period by~~ using the smoothed feature parameter for spectral envelope characteristics and said feature parameter for a gain.

58. (Currently Amended) A ~~recording~~ computer readable storage medium which ~~records~~ stores a computer executable program performing a method of decoding speech signals by changing a decoding operation corresponding to plural types of received feature parameters according to whether the speech are classified as being a voice period or in voice-less period, the computer executable program operable to, when executed by a processor, ~~cause a device to~~ perform the acts of:

smoothing at least one of the feature parameters according to an elapsed time from a time point when a transition occurs from the voice period to the voice-less period; and

decoding the speech signal in the voice-less period by using the smoothed feature parameter.

59. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 58, wherein the smoothing step further comprises the steps of:

(a) providing at least one of the received feature parameters as it is as the smoothed feature parameter in a certain time period immediately after changing from the voice period to the voice-less period; and

(b) smoothing at least one of the received feature parameters in a time period other than the certain time period.

60. (Currently Amended) A ~~recording~~ computer readable storage medium which ~~records~~ stores a computer executable program performing a method of decoding speech signals by changing a decoding operation corresponding to plural types of received feature parameters according to whether the speech are classified as being a voice period or in voice-less period, the computer executable program operable, when executed by a processor, ~~cause a device to~~ perform the acts of:

smoothing at least one of the feature parameters according to the feature parameters, wherein the smoothing changes a coefficient used to smooth at least one of the received feature

parameters according to information representing whether a new feature parameter is transmitted or not; and

decoding the speech signal in the voice-less period by using the smoothed feature parameter.

61. (Currently Amended) The recording computer readable storage medium of claim 60, wherein the smoothing step further comprises the steps of:

(a) providing at least one of the received feature parameters as it is as the smoothed feature parameter while the feature parameter satisfies a predetermined condition; and

(b) smoothing at least one of the received feature parameters after the condition is not satisfied.

62. (Currently Amended) A recording computer readable storage medium which ~~records~~ stores a computer executable program performing a method of decoding speech signals by changing a decoding operation corresponding to plural types of received feature parameters according to whether the speech are classified as being a voice period or in voice-less period, the computer executable program operable, when executed by a processor, cause a device to perform the acts of:

smoothing, in a subsequent period, at least one of the feature parameters according to information representing whether a new feature parameter is transmitted or not; and

decoding the speech signal in the voice-less period by using the smoothed feature parameter.

63. (Currently Amended) The recording computer readable storage medium of claim 58, wherein the smoothing step smoothes at least one of the received feature parameters according to an elapsed time from when a transition occurs from the voice period to the voice-less period, and the feature parameters.

64. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 58, wherein the smoothing step smoothes at least one of the received feature parameters according to an elapsed time from when a transition occurs from the voice period to the voice-less period, and at least one of the feature parameters, after at least one of the feature parameters is used as it is.

65. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 60, wherein the smoothing step smoothes at least one of the received feature parameters according to an elapsed time from when a transition occurs from the voice period to the voice-less period, and at least one of the feature parameters, after at least one of the feature parameters is used as it is.

66. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 58, wherein the smoothing step further comprises the steps of:

(a) providing at least one of the received feature parameters as it is, in a first time period immediately after changing from the voice period to the voice-less period and in a second time period while the feature parameter satisfies a predetermined condition; and

(b) smoothing at least one of the received feature parameters in a time direction after the first time period or the second time period is past.

67. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 58, wherein the smoothing step changes a coefficient used to smooth at least one of the received feature parameters according to information representing whether a new feature parameter is transmitted or not.

68. (Cancelled)

69. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 62 further comprising the step of receiving the information representing whether a new feature parameter is transmitted or not.

70. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 67 further comprising the step of receiving the information representing whether a new feature parameter is transmitted or not.

71. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 68 further comprising the step of receiving the information representing whether a new feature parameter is transmitted or not.

72. (Currently Amended) A ~~recording~~ computer readable storage medium which ~~records~~ stores a computer executable program performing a method of decoding speech signals based on received feature parameters by changing a decoding operation according to whether the speech signals are classified as being a voice period or a voice-less period, at least a part of decoding process the computer executable program operable, when executed by a processor, cause a device to perform the acts of:

determining a weighting coefficient used to generate an excitation signal of the voice-less period by performing a weighted sum operation of plural types of signals based on at least one of the received feature parameters; and

generating the excitation signal based on the weighting coefficient, and generating speech signal in the voice-less period by feeding the excitation signal to a synthesis filter.

73. (Currently Amended) A ~~recording~~ computer readable storage medium which ~~records~~ stores a computer executable program performing a method of decoding speech signals based on received feature parameters by changing a decoding operation according to whether the speech signals are classified as being a voice period or a voice-less period, at least a part of decoding process the computer executable program operable, when executed by a processor, cause a device to perform the acts of:

smoothing the received feature parameters and calculating smoothed parameters;

determining a weighting coefficient used to generate an excitation signal of the voice-less period by performing a weighted sum operation of plural types of signals based on at least one of the smoothed parameters; and

generating the excitation signal based on the weighting coefficient, and generating speech signal in the voice-less period by feeding the excitation signal to a synthesis filter.

74. (Previously Presented) The speech decoding device of claim 1, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

75. (Previously Presented) The speech decoding device of claim 2, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

76. (Previously Presented) The speech decoding device of claim 4, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

77. (Previously Presented) The speech decoding device of claim 6, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

78. (Previously Presented) The speech decoding device of claim 21, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

79. (Previously Presented) The method of claim 34, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

80. (Previously Presented) The method of claim 35, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

81. (Previously Presented) The method of claim 37, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

82. (Previously Presented) The method of claim 39, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

83. (Previously Presented) The method of claim 50, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

84. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 57, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

85. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 58, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

86. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 60, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.

87. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 62, wherein said smoothing in a subsequent period is performed even when a new feature parameter is not received.

88. (Currently Amended) The ~~recording~~ computer readable storage medium of claim 73, wherein smoothing in a subsequent period is performed even when a new feature parameter is not received.